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# Development and characteristics of central business district under the philosophy of health

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**Abstract**

CBD takes a large proportion in total investment attracted in cities. The good and healthy space environment for business is an essential factor to attract external investment. This article analyses main characteristics of CBD to give the crux for decline of space environment quality of CBD at present. Then it puts forward some ideas for solving these problems as well as relevant strategies and methods.

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**1. Introduction**

CBD is the short form of Central Business District. It was firstly proposed by E. W. Burgess, an American urban geographer, in 1923 in his famous mode of concentric circle regional structure of city. He considers that a city expands from inner to outer in the way of concentric circle. The spatial structure could be divided into five circles. The center of the circle structure is the city's geographic and functional core which is called CBD. The CBD of modern society can be described as follows: It integrates a great deal of financial, business, culture and service institutions, and lots of supporting facilities, such as business office buildings, hotels and apartments, etc., with perfect and convenient traffic, communications and other infrastructures, favorable economic development environment and places which are convenient for commercial activities. Among other things, corporation headquarters, financial centers and specialized production service are three functional structures of the present CBD and they also represent the most

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basic characteristics and connotation of the present CBD.



Fig. 1. Manhattan of New York.

These regions, such as Manhattan of New York in Fig. 1, La Defense of Paris, Shin-juku of Tokyo, Singapore Centre Region and Nanjing Road of Shanghai, are all famous CBDs in the world. These regions always integrate a large number of facilities, such as financial, business, cultural, service facilities and commercial offices, hotels and apartments and other facilities, and also possess modern infrastructures and favorable environment, such as perfect and convenient traffic and communications. These multi-functional business central districts often need an area of three to five square kilometers or even more larger scale; and the building capacity is relatively high. The building capacity is at least more than four or five million square meters or even more than ten million square meters, of which, the office buildings account for about 50%; the business facilities, hotels and apartments account for 20% respectively and the others are all kinds of necessary supporting facilities [1]. They always have the following characteristics:

Function activities characteristics:

Business activities, office institutions and service and recreation facilities are intensive and have high grade and strong radiating power. The functions and services provided by CBD are always the highest in local area. This area has the highest service centralization level and can provide extensive services for economy, management, recreation, culture and even administration.

Industry characteristics:

Tertiary industry plays the dominant role and gradually substitutes the manufacturing industry in the central district. Some CBDs have the most concentrated and highest level retailing of the district.

Characteristics of land use:

The CBD usually has a peak land value. Intensity of land exploitation and utilization is higher. This district has the highest land price and rent in the city.

Characteristics of architecture:

The floor area ratio and building density are high and the building form grows vertically.

Population characteristics:

CBD has the most visitor flow in the urban region and is a district with the most population in the urban region. The difference between ratios of daytime population to nighttime population is great. The 24-hour personnel change is also the largest.

Employment characteristics:

It has high employment density and high quality employees.

Traffic characteristics:

It is a peak traffic value intersection and the traffic transfer is concentrative. It has more accessibility

and has the most developed communication between internal and external traffics.

## 2. Current situation and hidden danger of CBD

CBD is the comprehensive representation of the gathering and distributing of urban population, land utilization patterns and the level and trend of industrialization. The focusing effect can bring more business opportunities with lower cost and promote economic development of city; however, it can also bring some negative effects, such as heavy traffic, serious pollution and excessively dense population[2].

The vertical and three-dimensional building environment of CBD will restrain the circulation of air and aggravate acid rain and greenhouse effect of the city further [3]. Besides, the artificial heat and discharge heat brought by large population and economic activities will directly affect the thermal radiation quantities and air quality of the city. At the same time, the street for which the sunlight and day-lighting is covered by buildings and the buildings towering high in the air form 'City Valley' and maybe bring corner effect, wake effect and pipeline effect and then bring harms caused by wind. Meanwhile, the particular environment which is composed of artificial concrete forest and the lack of water body, greenbelt and other soft surfaces all also further affect environmental precipitation and the humiture. These matters not only do harm to environment, they also have a negative impact on personal health.

### 2.1. Sub-health condition

The crowd working in CBD tends to have certain advantages of age and income and there are also some problems in their health. These people, who work for a long time at closed environment and also have psychological stresses, often take on sub-health conditions. Some people prematurely suffer from chronic diseases, such as obesity, fatty liver, Type II diabetes, gout, fatigue syndrome, neurasthenia, etc.

### 2.2. Sick Building Syndrome

Central air conditioners are basic facilities of CBD building. On the one hand, these facilities provide the staff in the building with comfortable working environment; on the other hand, they make the indoor air pollutants, such as inhalable particulate matter, formaldehyde, benzene, toluene, xylene and volatile organic compounds, gather together and haunt round for a long time. Besides, it is likely to cause radiation pollution that duplicators, computers and other equipments are overly dense. Working in such an environment for a long time may bring on hidden danger of health, such as headache, chest distress, dysphoria, fatigue, skin sensibility and air-conditioning disease, etc. These problems are called "Sick Building Syndrome" by WHO [4]. Sick Building Syndrome which was firstly proposed in Europe and America has caused increasing concern in Asia in Fig. 2.



Fig. 2. Sick Building Syndrome

### 2.3. Hidden security danger

High land price for CBD, particularly core district (in the centre of the city), makes the living function be undermined gradually, causes over great contrast of day-night population and excessive disparity of day-night population ratio. The residents living in low-rise houses can easily be familiar with each other and the sense of duty for managing and monitoring such space also can be easily aroused, which can help to prevent crime. And that it will be very difficult for numerous households living in high-rise houses to have a sense of duty for maintaining and managing the open space, which may easily cause hidden danger of security [5].

### 2.4. Alienated interpersonal relationship and psychological hidden danger

Although the staff of CBD work together in one office building or live in one apartment, they always have no contact with each other because of the difference of each other's unit and company. For working under high pressure, even though some people work in the same office or unit, they also just have quite indifferent human feelings and alienated interpersonal relationship, forming so-called "Interpersonal Isolated Island".

As the higher the building and the bigger the volume of the building becomes, the greater the sense of oppression of space is; and the interaction between high-rise building and the space outside the building is poor, which can easily cause the lack of exercise. Besides, some dead corners of the high-rise building safety result in poor precautions measures and high crime rate, which will also bring increasingly more panic psychology. These objective unfavorable factors add to psychological problems of the staff.

## 3. Ideas and methods of resolution

The elaborate arrangement of the buildings, streets, vehicles and elaborate landscapes in the city, town or village forms our living homeland and our resources and technologies will be organized to make up a form we want to express. This will be the key to a healthy evolution of mankind in future and also determine the destinies of numerous other species [6]. It is a question that how to solve the hidden dangers in CBD, which has been considered by many academicians and officials. In the course of exploration, two paths have grown up; the first is how to perfect and improve the material factors—building design and planning for park etc. and introduce ecological buildings, sustainable buildings and other concepts and practices; and the second is how to promote the immaterial factors of CBD; for example, Hong Kong of China and Jing'an District of Shanghai have integrated healthy concepts into

property management and the activities to establish healthy buildings.

### *3.1. Origin of theory—ancient oriental philosophy and Chinese geomantic omen theory*

The famous British sinologist Joseph T. M. Needham (Joseph T. M. Needham, from Dec. 9, 1990 to Mar. 24, 1995), summed up: “For Chinese, natural world is not something which has hostility and evil and can be overcome forever by will and violence. It is more like the greatest object in all living things. We should know its principle of rule and make the beings live in harmony with the nature. If you like, you could call it organic naturalism. No matter how people describe it, this is the basic attitude of Chinese culture for a long time”. Chinese pay extraordinary attention to heaven-man relation, i.e. the relation between human and the nature. Based on this, a special geomantic omen has been formed. Geomantic omen thought is based on the theory of Ying and Yang, Wu Xing or Five Movements of Chinese traditional philosophy, which is a combination of geography, meteorology, landscape science, ecology, psychics and moral principles. Landscape culture with nature care inspires in buildings in urban environment.

### *3.2. Realistic power—problems in modern building*

The industrial revolution which happened from late eighteenth century to early nineteenth century took great changes for social productivity. Swift and violent development of modern industry brought new buildings, new materials, new technology and new production modes. In the 1920s, modern movement of architecture experienced the first great leap - modernism architecture. It met great social demand with simple, rapid, economic and practical features. As it adapted to production status at that time, modernism architecture brought an active promotion effect to the social development. But after this movement was the craze all over the world, various disputes and crusade appeared. Even the popular Miesian style was no exception, either.

MIES VAN DER ROHE was good at using steel and glass and makes structures completely exposed to show the exquisitely technological level. Even if it is not allowed to expose steel members considering the fire protection requirements, it is also required to add ornamental members on the buildings. Miesian steel and glass could be found all over the world, like private residence, low-rise building or high-rise buildings. The glass curtain wall could be found everywhere, which took a great waste of material and also was one of reasons for the urban heat island effect in Fig. 3. Some of the designers began to consider the planning scheme integrating beautiful appearance and perfect, reasonable functions. They were aware that excessive pursuit of appearance as well as mechanical combination which was lack consideration on economy, culture, society and tradition will bring weak milk of human kindness and lacking of flavor of life.

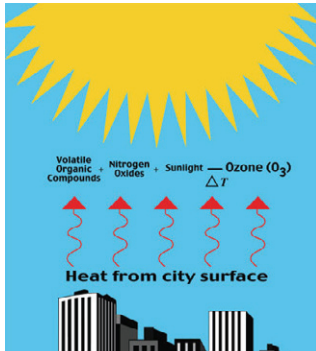


Fig. 3. Urban heat island effect Building Syndrome.

### 3.3. Self-examination in technology –emergency of humanism

Martin Heidegger thought the modern science and technology overemphasizes self properties as a tool and gradually disregards objects' right to naturally exist and only regards them as a target to attacking and overcoming. All in material universe including human-body must monotonously show its existence with functionality and materiality and would become the foreseeable, calculable and consumable technical objects. The Martin Heidegger's view on technology represents opinions of many scholars on scientific development. They struggle against blind technological optimism thought and are anxious about scientific and technical development without any consideration to consequences as well as about trend of pan-technology in social culture.

In architecture filed, humanistic weltanschauung and sense of worth established in modern times in the West have been gradually accepted by architects. Many of architects have been working on changing the city to a place suitable for human living, i.e. making people know the certain meaning and characteristics of their existence. It emphasizes "human- center" in architectural culture. The human being does not just mean physical and physiological sense. It also involves social, emotional and "multi-element" sense. The "human-being" in city is not only the human in ecosystem, but also dependent with various beings in natural world.

## 4. Main principle of health CBD design

SARS promoted the research of healthy architecture. After SARS, relevant departments launched researches and pilot projects on healthy housing and published "Key Points on Construction Technology of Healthy Housing". Beijing Olympic Garden and Beijing Gemdale Green Town have been listed into healthy housing pilot projects. Although there are many discussions about healthy architecture, there are few researches on healthy CBD. Being combined with the theory research before and current physical truth of CBD in China, this book acknowledges that architecture design for healthy CBD should be based on sustainable development principle and combines the relevant theories of bionomics and architecture technology, reasonably arranges substance and energy factors inside and outside the architecture to create healthy and comfortable environment for human living and prevents influence of office facilities on environmental and social benefits. It can ensure that people have mental health, ethical health and social

adaptation health. The detailed characteristics are as below:

#### *4.1. The harmony between architecture and environment*

The harmony between architecture and environment should be achieved. It is not only limited to harmony for vision, but also includes consistent of spiritual and adaptation of ecology and climate till to create a suitable lifestyle. If there is a special or individual building in CBD area, the contiguous area should provide the environment which is harmonize with it. Attention should be paid to the combination with building, space, natural environment and communications, such as setting walking parkway and public traffic parkway. The city artwork of CBD site should pay attentions to competitive products. They, such as sculpture, fresco, fountain, the bank at the edge of rivulet and coastline of shore, all should pay attentions to show the modern urban style in Fig. 4.



Fig. 4. Zorlu Ecocity, Istanbul.

#### *4.2. Energy-saving and health of inner environment*

The inner hot environment indicator in business building should be related to the operating efficiency and energy efficiency ratio of exterior surrounding structure heat preservation technical system and heating and cooling systems. It needs to create conditions for actively utilizing like solar energy, subterranean heat, and wind energy and other renewable energy resources to reach a comfortable humidity and temperature and create a good working condition. Emphasize that the natural ventilation convection method should be adopted as far as possible to set up natural air circulation system, draw in fresh air and ensure the proper ventilation for office space to prevent indoor air pollution from bodily harm.

#### *4.3. The integration environments between users and green nature*

Proper spatial distribution, commodious space environment and hierarchical system form the mutual integration environments between users and green nature on vision, hearing, nose and feeling in Fig. 5. Coefficient of natural lighting should be added. A healthy light environment is created though good quality natural lighting system and reasonable depth of room, attention of indoor artificial lighting, light pollution of working area and the routine safety of public area. While noise prevention planning has been completed, noise prevention measurements indoors should be strengthened as well. The selection of material and structure treatment for separating wall and floor should also be strengthened. A peaceful, harmonious living and working environment will be provided for users by reducing noise and creating a good sound environment [4].



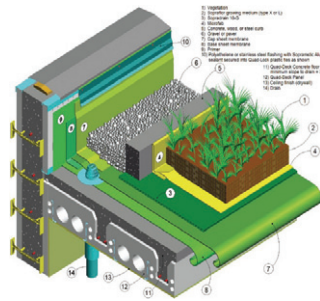


Fig. 5. The green roof diagram.

#### 4.4. The construction site

During design, the construction site should be completely considered, which include like building's orientations, position, distribution, the utilization of landform and topography, considering of the site. The perfect water environment includes construction water supply system, drainage system, indoor drainage system, rainwater utilization system and water environment system in landscape and relevant safety standards.

#### 4.5. Sustainable design principles

The construction should have enough flexibility and sustainably to contain the application and development of future science and technology. Buildings have growth characteristics including the consideration for weight capacity of bases and floor, the adaptability with the new energy, new communications, the changing of the new correspondence method, allowance of pipeline space including the development space of water, electricity, communication and the transmutability for arrangement of indoors and the system of furniture.

The research of healthy CBD is a symbol of unification of various elements, such as modern city, human, society, architecture, nature, technology and information in Fig. 5. It is the reasonable answer of space environment of the city facing with realistic question. We must know clearly that the research of healthy CBD is a systematic working. It needs the cooperation from various disciplines like architectonics, biology and envirointology and long-time observation and argumentation.

### 5. Conclusion:

Taking Shanghai Pudong business area as an example, 105 buildings including Jin Mao tower and Lucky Mansion brought total investment over RMB 120 billion Yuan, which accounts for 41% of the total investment of Pudong new area in 2008. The enormous economic benefit makes more and more municipal administrators realize that the importance of value and position of central business districts. Government at all levels through preferential policies and overall packaging strategy improves the occupancy rate of CBD building to promote the local economic development. During this process, except the economic zone of urban commercial space, whether it can provide healthy and environmental protection environment has becomes a key variable to attract international corporations especially some



of the famous enterprisers. It is also an important measure to improve the space charm of CBD.

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